

# 100% Renewable Martha's Vineyard



# The Earth at Night



NASA composite photo

# 100% Renewable MV Background

- The Vineyard Sustainable Energy Committee, along with the MVC Climate Action Task Force, is sponsoring a non-binding warrant article for the Annual Town Meeting in each of our towns
- Adoption of the 100% Renewable MV article will establish Island-wide aspirational goals for our community as it confronts the climate crisis and informs long-term strategic plans for a stronger, more resilient, and more sustainable future

# Island Climate Action Groups

- Town energy committees (address town issues; develop town energy plans)
- VSEC (Vineyard Sustainable Energy Committee - all-Island energy committee)
- MVC Climate Action Task Force (tasked with developing adaptation and energy transformation regional plans)
- Island Climate Action Network (ICAN; citizen advocacy group)
- Vineyard Power (our island cooperative, focused on offshore wind – an important element of our 100% Renewable effort)

*VSEC is sponsoring the 100% renewable article in all 6 towns; once established, the goals will be used by the MVC CATF for the Island's master plan for energy*

# Why 100% Renewable?

- Climate change is here, and the impacts are accelerating
- As a coastal community, Martha's Vineyard has much at stake...
- ...and has an opportunity and obligation for leadership
- Both adaptation to a changing climate, and elimination of the causes of that change (mitigation), are necessary
- The 100% Renewable effort addresses mitigation through transformation of our energy ecosystem
- We need goals before we can establish roadmaps for our towns and region

# Red Flags (accelerating!)

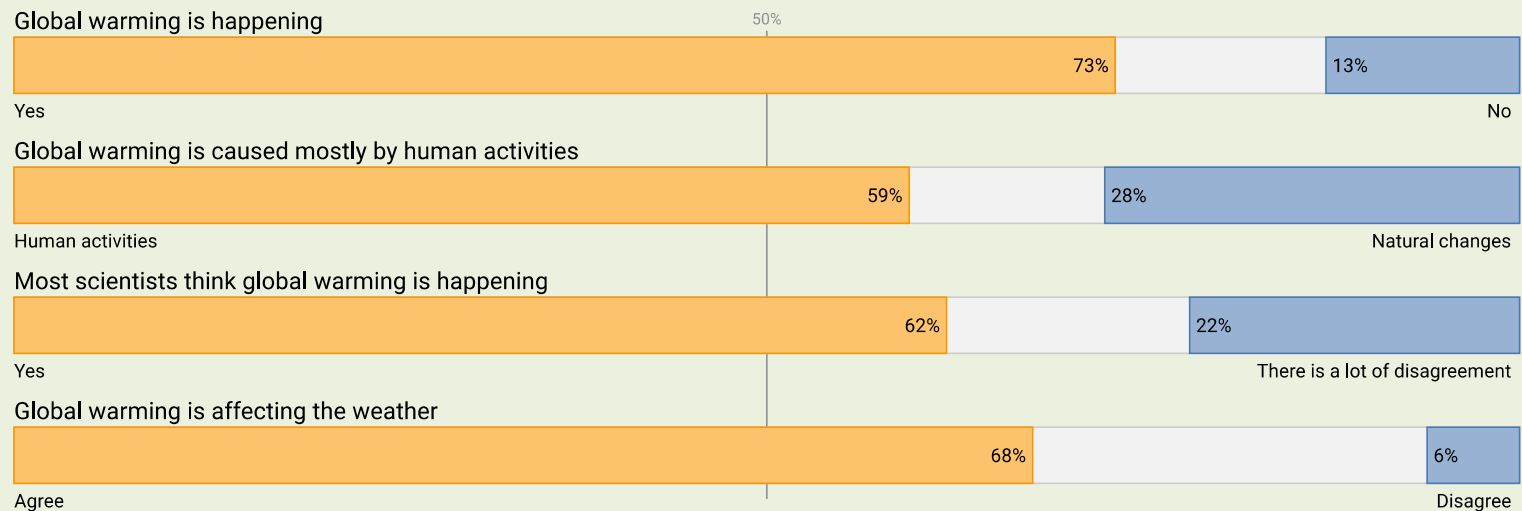
## *December 2019:*

- UN: global warming is approaching a “point of no return”
- Cracks in Greenland ice sheet portend higher sea level rise
- Global emissions have risen for three consecutive years
- Victoria falls dries to a trickle
- As Trump abdicates climate change leadership, the world continues to melt
- Greenland’s ice losses are 7X expected levels – in line for highest sea level rise
- Severe weather across Europe leaves at least 8 dead
- Australia has hottest day on record across the continent (106 F average high)
- 140 brush fires in Australia – many are “too big to put out”

# MV Understands the Need for Action

## Public Opinion Estimates, Dukes County, Massachusetts, 2019

### BELIEFS

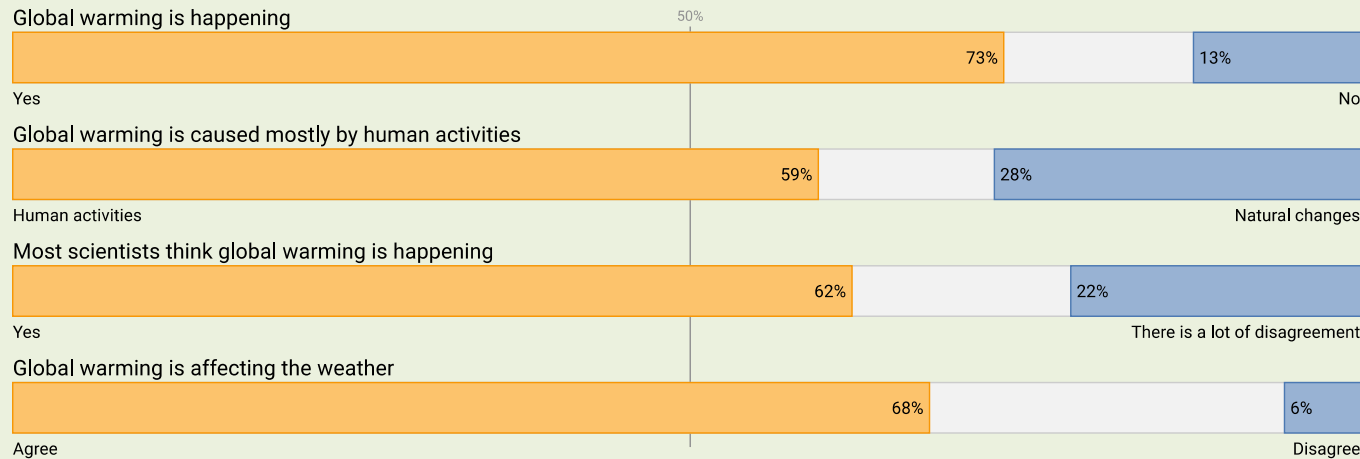


*Yale University program on Climate Change Communications Data*

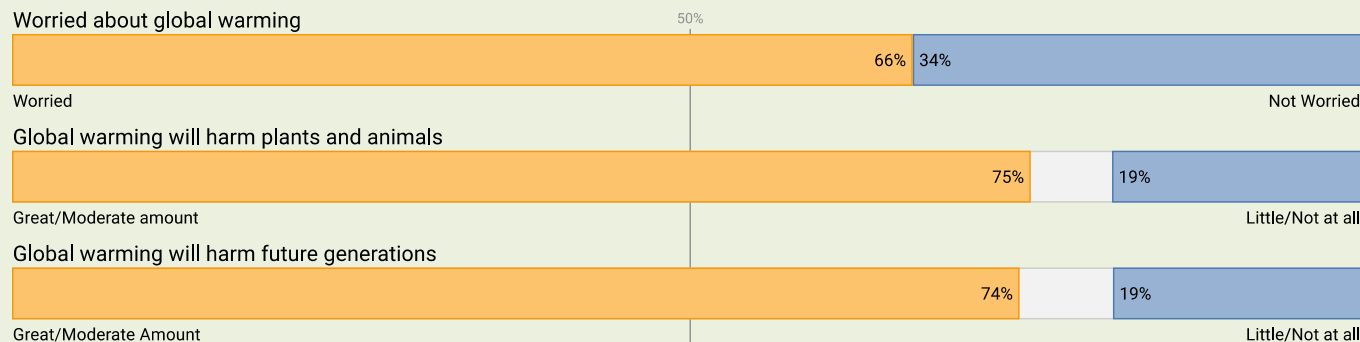
# MV Understands the Need for Action (2)

Public Opinion Estimates, Dukes County, Massachusetts, 2019

## BELIEFS



## RISK PERCEPTIONS





# 100% Renewable MV Community Resolution

*Focus: responsible change, and development of a resilient infrastructure to protect and defend our Island home*

- **Reduce fossil fuel use on the Island, from a 2018 baseline:**
  - 50% by 2030
  - 100% by 2040
- **Increase the fraction of our electricity use that is renewable:**
  - To 50% by 2030
  - To 100% by 2040
- **Foster biosphere carbon capture through:**
  - Adoption of regenerative agriculture and landscaping
  - Protection and expansion of wetlands
  - Preservation of woodland resources

# Massachusetts Statewide Goals

- **Global Warming Solutions Act (2008)**
  - 25% reduction in GHG emissions (from 1990 levels) by 2020\*
  - 80% reduction by 2050
- **Required renewable electricity (mandated utility portfolio standard)**
  - 15% by 2020
  - Increasing by 2% per year (35% by 2030)
- **The 100% Renewable Energy Act (proposed; H.2836, S.1958)**
  - 100% renewable electricity by 2035
  - Phase out of fossil fuels for heating and transportation by 2045

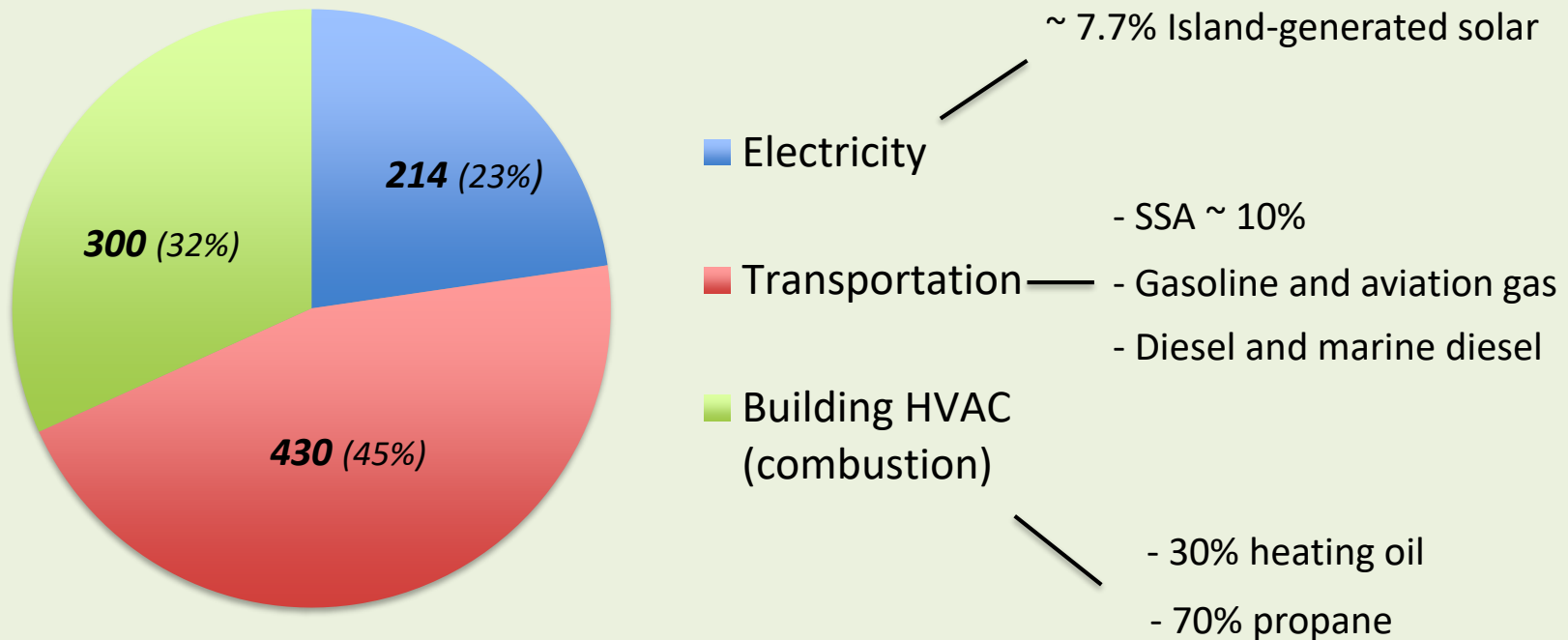
*\* MA achieved 21% by 2018*

# Are Other Communities Setting Similar Goals?

Yes.

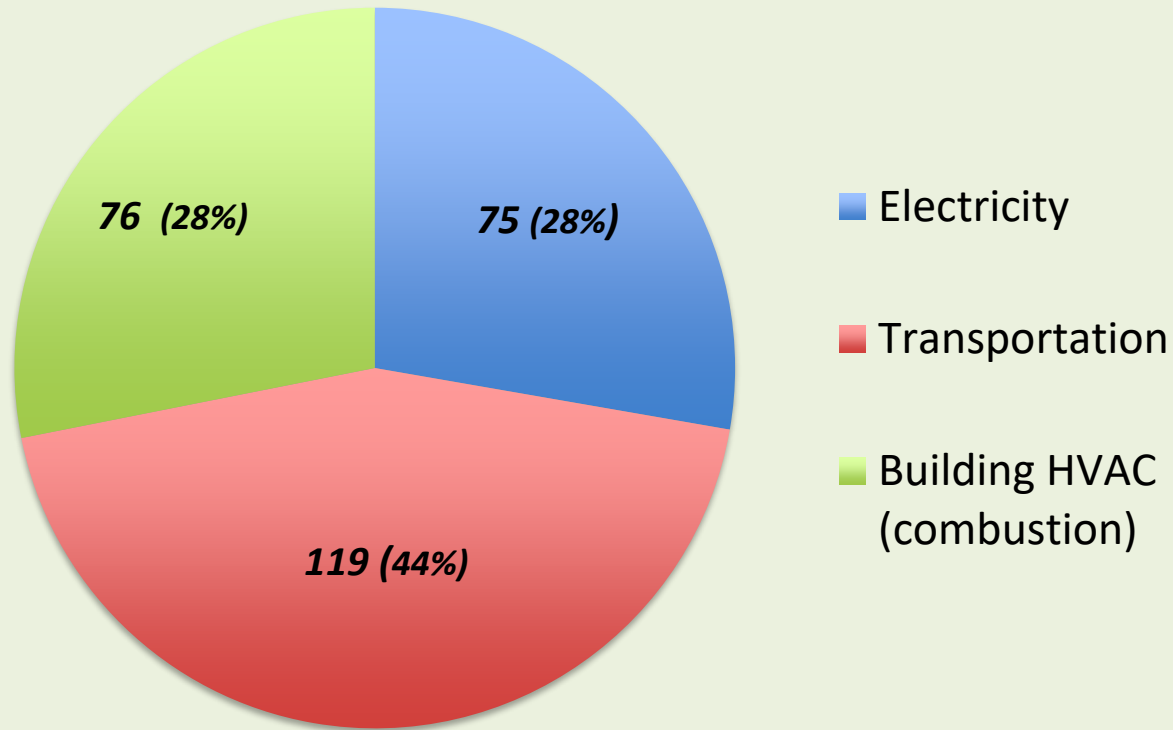
- In the US, there are more than 140 cities and towns setting energy and greenhouse gas goals, along with at least 9 states
  - At least 12 towns in New England (Amherst, Lowell, Northampton, Keene, NH....)
  - HI, CA, NM, MA, WA, ME, NY, NJ, NV, VT, Puerto Rico
  - More expected within a year
- Over 220 cities around the world
- At least 36 Fortune 500 level corporations

# MV Energy Baseline 2018 (GWh)



*Total annual energy  
use ~ 945 GWh*

# MV CO<sub>2</sub> Baseline 2018 (kTonnes)



*Total annual emissions  
~ 270,000 metric tons  
(606 million pounds)*

# Can We Achieve The Goals?

- **The overall strategy to do so is straightforward**
  - Electrify transportation and building heating and cooling
  - Decarbonize our electricity infrastructure and make it resilient
- **The technology to do this is available and is becoming increasingly cost-effective**
  - Offshore wind is already less expensive than fossil fuel electricity
  - Electric vehicles are rapidly becoming cost effective
  - Cold-climate heat pumps are effective and affordable
  - Energy storage – via batteries at small scale and hydroelectric at large scale – is advancing rapidly
- **Inertia is our enemy** (*“2040 is too far in the future to be worried, but far too soon to change...”*)

# Impacts: Residents and Property Owners

- **Transition to electric vehicles (over two decades)**
  - Light-duty electric vehicles are cost effective today, and widely available
  - Heavy duty / off-road vehicles are coming
- **Electrification of heating / cooling / hot water (over two decades)**
  - Air source heat pumps for HVAC have lower energy cost than fossil fuels, and both heat and cool with the same equipment
  - Community buying programs for heating, cooling, and solar energy systems will lower the cost of upgrading from oil/propane
- **Continued addition of distributed solar generation and storage**

# Electric Vehicles Have Arrived

- EVs are becoming more affordable...
- Operating and maintenance costs are significantly lower than for ICE cars...
  - Effective MPG : ~120 mpg
  - Maintenance savings of 30 – 50%
- So life-cycle costs can be comparable\*
- Charging technology is significantly faster (30 minutes for 200 miles)
- Pickups are coming in 2020; F150 and utility vans in 2021
- Heavy equipment can – and will – be electrified

\* And already are in Canada, Sweden, and UK





# Sample 2019 Prices for EVs

*US News and World Report data*

## Cheapest Electric Cars in 2019

- 2019 Smart EQ Fortwo - \$26,740 \*
- 2019 Nissan Leaf - \$29,990 \*
- 2019 Hyundai Ioniq Electric - \$30,315 \*
- 2019 Volkswagen e-Golf - \$31,895 \*
- 2019 Fiat 500e - \$33,210 \*
- 2019 Kia Soul EV - \$33,950 \*
- 2019 Tesla Model 3 - \$35,400
- 2019 Chevrolet Bolt - \$36,620 \*\*
- 2019 Honda Clarity Electric - Lease Only
- 2019 Hyundai Kona Electric - \$36,950 \*
- 2019 Kia Niro EV - \$38,500 \*
- 2019 BMW i3 - \$44,450 \*

\* \$7500 federal tax credit

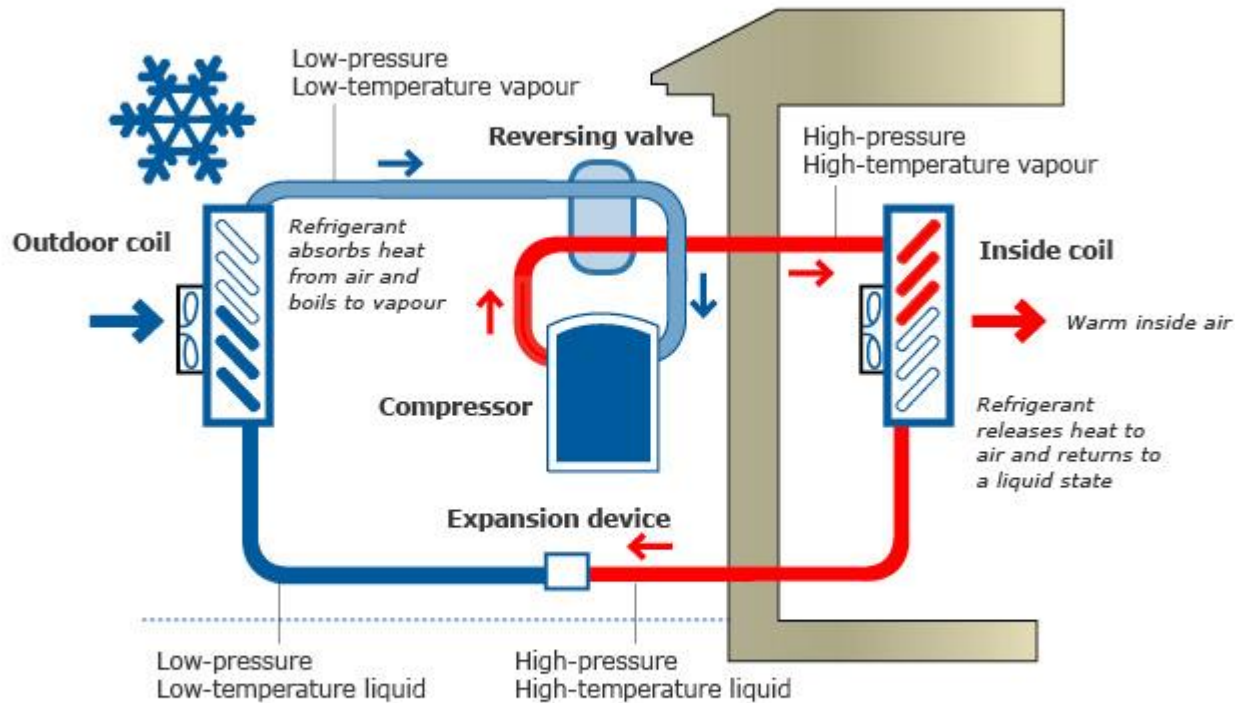
\*\* \$1875 federal tax credit

# Heat Pumps Replace Furnaces and Boilers

- Heat pumps provide heating, cooling, and dehumidification with the same unit
- Heat pumps are efficient
  - 1 unit of energy delivers 3 units of heat
  - Propane / oil: 1 unit of energy delivers ~ 0.8 units of heat
- New designs are suitable for cold climates (down to -15 °F)
- Estimated life: 20 years for HP, 15-20 years for propane boiler
- Community buying programs lower initial price by 3 – 10%



# How Heat Pumps Work



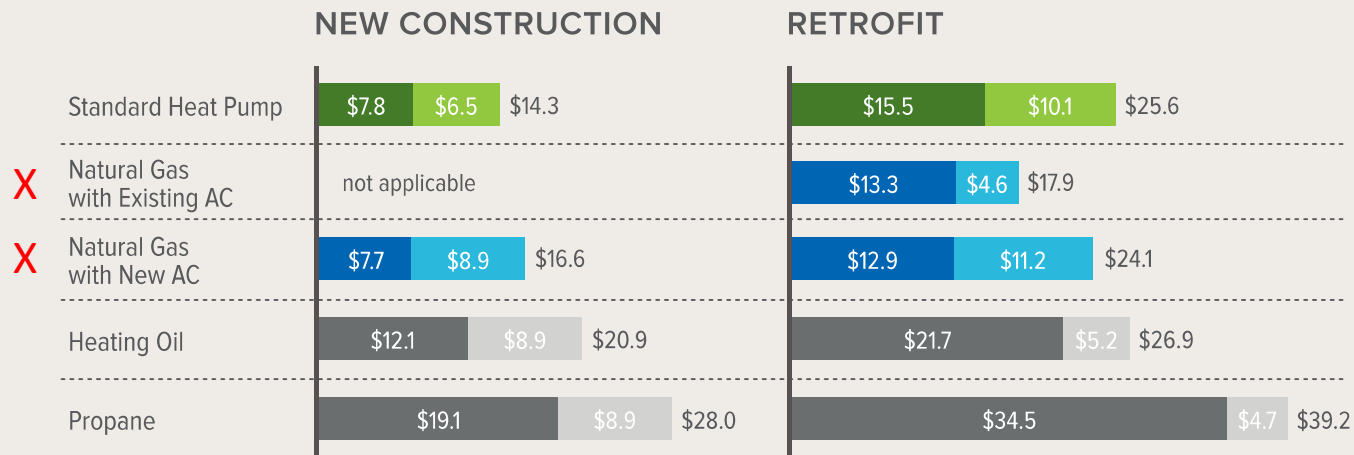
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[www.sciencelearn.org.nz](http://www.sciencelearn.org.nz)

*Reversing the flow cools the inside!*

# Heat Pumps Lower HVAC Costs

**FIGURE 18**

NET PRESENT COST OF WATER AND SPACE CONDITIONING, PROVIDENCE (THOUSAND \$)



- Heat Pump Energy Costs
- Heat Pump Fixed Costs
- Natural Gas Energy Costs
- Natural Gas Fixed Costs
- Heating Oil/Propane Energy Costs
- Heating Oil/Propane Fixed Costs

*- 2400 square foot home*

*- Assumes "leaky" construction for retrofit*

Rocky Mountain Institute Study, 2019

# Financial Assistance for Action

- Rebate / assistance programs
  - Federal and state rebates
  - Cape Light Compact rebates (heat pumps, HP water heaters, other)
  - Massachusetts SMART program (solar PV)
  - State and federal tax credits (solar PV)
  - MassCEC solar loan program
  - State income-based solar loan support
- Community buying programs (solar, HVAC)
- Grant programs for municipal climate action

# Impacts: Businesses and Economy

- Change will occur gradually, and hopefully predictably
- New business opportunities will be available for entrepreneurs
- New job opportunities will be created for islanders
- Our traditional business sectors will be maintained
- Martha's Vineyard will be increasingly attractive for visitors

# Impacts: Towns

- The energy transformation will be challenging, but less so than *adaptation* to the changed climate
- There will be costs
  - Net Zero Energy / Fossil Fuel municipal buildings
  - Likely partial funding of electrical infrastructure / resilience upgrades (microgrids)
- Innovative policy changes (e.g., building codes and other requirements) will be important
- Town committees and departments will need to view issues through the lens of climate change requirements
- Town leaders will need to work across boundaries with the appropriate balance of town and regional perspectives

# Next Steps

- Approval of the 100% Renewable MV warrant article across the Island
- Completion of the MVC CATF energy transformation plan
- Development of both town and regional 5-year energy roadmaps
- Annual progress assessments
- Course changes as needed!

***We can do this !***